

Thoughts on the Precautionary Principle

Bill Menke, January 10, 2015

According to Wikipedia, the “Precautionary Principle (PP) or precautionary approach to risk management states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is not harmful, the burden of proof that it is not harmful falls on those taking an action”.

Several issues underpin the application of the PP:

The manner in which an “action” or “policy” is identified, the language used to express it, and the process of calling for a review of its safety. In practice, the application of the PP must be limited to policies and actions with unsettled safety; else it becomes diluted by pro-forma application to triviality. Actions and policies associated with new technologies, such as gene manipulation in organisms, are easy to recognize as having unsettled safety, because they are based on recently-invented technologies with which society has had little experience. Others, such as deforestation and ocean over-fishing, relate to practices that differ only in degree to those occurring since antiquity. The threshold for focusing attention on an action or policy needs to be sufficiently high so as not to overwhelm society’s ability to analyze risks, yet not so low as to disallow the revisiting of ongoing actions or policies once believed to be safe. The language used to express an action or policy affects that way it is perceived and analyzed. Thus, for example, “eating too much fish”, “factory-fishing”, “overharvesting fish stocks” and “banning drag netting” all relate to ocean over-fishing, but focus attention on somewhat different aspects of the problem. On the one hand, the PP is an ethical principle, urging individuals and groups to be proactive in reviewing the safety of actions they take and policies that they promote. On the other hand, it is a regulatory principle that implies some level of societal regulation of the review process and the enforcement of bans on actions and policies deemed to be unsafe.

The ability to identify and focus attention upon a “suspected risk”. Many significant health and environmental problems associated with actions and policies have been completely unforeseen, even though at least some effort was made to identify risks associated with them. On the other hand, some highly-publicized risks have turned out to be based on misinformation or even outright fraud. An example of the former would be the near-extinction of the White-Rumped Vulture in India due to the use of the analgesic Diclofenac to relieve arthritic symptoms in cows. Diclofenac, in use since 1973, was considered safe in veterinary applications, in the sense that its side effects in livestock had been studied and were well understood. However, its toxicity to birds was initially unrecognized. Furthermore, this toxicity did not become an issue until its use broadened from highly-industrialized settings to rangeland where cow carcasses were consumed by the birds. An example from the other end of the risk-identification spectrum was the concern that autism spectrum disorders were linked to the MMR vaccine. Initial level-headed discussion of whether the suspected risk was a real one was replaced by near-cultish, but now-discredited, belief that it was the main cause of autism.

How relative risks are weighed and how actions and policies are judged safe enough to undertake. "Risk management" does not imply the elimination of every risk, an impossible ideal, but rather the quantitative assessment of relative risks and the adoption of the least risky alternative. Risk management is most effective when comparing a small number of alternative actions in a narrowly defined setting. Thus, for instance, while both bypass surgery and insertion of stents are risky medical procedures, a well-controlled study of patient outcomes might establish whether one or the other decreases the chance of death following a heart attack, compared to no intervention at all. Management of heart attack risk is facilitated both by heart attacks being a common and well-understood problem and by patient survival being the clearly-desired outcome. Even so, such analysis would not necessarily examine every risk, for instance, the possibility that increased use of antibiotics during these surgical procedures might lead to antibiotic-resistant bacterial infections that will kill more people in the general population than heart attack intervention saves. Problems associated with risk identification and assessment abound in environmental issues. Nuclear power is a prominent example where proponents and opponents disagree on the types of risks that should be considered and where little quantitative information is available to establish relative risk. For example, proponents have argued that nuclear power is less risky than continued use of coal, in a world experiencing anthropogenic climate change that will have catastrophic societal and environmental effects. Opponents have argued that the continued use of nuclear power promotes the proliferation of nuclear weaponry and poses a high risk of global annihilation. Neither risk is implausible (though the language used to express them is arguably inflammatory) yet our ability to quantify these risks and to select between hypothetical outcomes is limited. Furthermore, the possibility that actions or policies in other spheres of human activity might have a larger effect on the risk of climate change or nuclear war is not entering into the debate.

How a "scientific consensus" is determined. Scientists develop a consensus by many means, including the peer review system for scientific publications, dialog at conferences and symposia, and summary statements developed by scientific societies. Often, the consensus is limited to a technical scientific issue (e.g. that the postulated Higgs particle exists), but in some cases, it has relevance to a societal problem. A good example is the consensus that has emerged in the medical community that antibiotic resistance is a serious health problem and that steps need to be taken to combat it. It developed after years of research and dialog within the medical community and included major press releases and Congressional testimony by the American Medical Association. The consensus on the reality of anthropogenic climate change is another example and a case where a formal government-sponsored review committee, the Intergovernmental Panel on Climate Change, contributed to its development. Nevertheless, at any given time, the number of subjects for which a clear scientific consensus has emerged is much smaller than the number of risk-related questions that have been posed. Furthermore, most scientific consensuses are limited issues that lie wholly within the sphere of a single scientific discipline. Consensuses that cross scientific disciplines are rarer, partly because few scientists have sufficient expertise outside of their own narrow disciplines. Cases are also rare where a scientific consensus has judged an action or policy "safe", in the sense of posing no risks of any kind, in part because no human activity is ever completely free of risk. More typically, the consensus is on the

degree of a given risk and a comparison of the action or policy associated with that risk to a small list of similar alternatives (as in medical treatment options).

While the PP places the burden of proof on the proponents of an action, it leaves open the important issues of the standard by which proof is judged and the mechanism by which a judgment of sufficient – or insufficient – proof is made. In some spheres of activity, regulatory agencies fill this role. Thus, for example, the US Food and Drug Agency has an elaborate process by which a pharmaceutical manufacturer establishes the safety of a new drug and is given permission to market it. Similarly, the US Environmental Protection Agency has a process through which an Environmental Impact Statement is published to disclose in advance likely harmful impacts of an action or policy proposed by the Federal government or one of its licensees, together with a requirement that the Least Environmentally Damaging Practicable Alternative be taken. Lawsuits provide another mechanism for judging safety, in the sense that a judgment in favor of a plaintiff alleging damage from someone who has taken an unsafe action is likely to discourage similar actions in the future. However, lawsuits are most applicable to cases where a jury is likely to find that a plaintiff has experienced actual damage; their application is more limited in cases where an action is alleged to lead to future damage, or where the damage is more “societal” as contrasted to “personal”. Finally, the PP is a call to public debate on a perceived risk; that is, the enforcement through public dialog of an ethical requirement for individuals and groups to think through the consequences of a proposed action or policy that they advocate, and a mean to develop a public consensus that an action or policy is worth whatever risk has been established it entails.

Worldview is big factor governing an individual’s application of the PP. Are the environmental problems that we are facing primarily due to the fast pace of innovation? Would we have fewer were we in a world limited to 1960’s technology? If so, then we must be especially wary of change. Or are our problems being driven by patterns of activity that were set centuries ago, but which are being accentuated by population growth and the catching up of the rest of the world to the high living standard of industrialized nations. If so, then only new actions and policies can break that pattern, and we must be especially careful not to stifle them.